

## MIT's Boyden Blows It Up to See It Better

You don't hear the expression "ground truth" much in biology, which would often settle for "reproducibility," at least in the short term, as a scientific goal. Ground truth is more the territory of physics, so it's no surprise that the lead-off hitter in this season's Wednesday Afternoon Lecture Series was trained in that science.

MIT's Dr. Ed Boyden studied physics and electrical engineering at both MIT and Stanford, where he collaborated with Dr. Karl Deisseroth in opening the field known as optogenetics. He has earned the right to stake out ground truths and shared generous portions of that search Sept. 2 in Masur Auditorium

before as large a crowd as one could hope to get just a few days prior to Labor Day.

NIH director Dr. Francis Collins opened the talk, touting both the series—"the high intellectual point of our NIH week"—and the speaker: "Ed is an innovator of the highest order."

Boyden, who holds six leadership posts at MIT, including teaching a course in "revolutionary ventures" that encourages entrepreneurship, directs a technology group determined to map the pathways from neurons to behavior, from the nanoscale to the macro.

"Can we map large-scale systems like the brain with molecular precision?" he asked.

Not if you can't see what you're doing.

To solve that problem, his team is pioneering "physical magnification—blowing things up to see them better."

The scientists have found methods to

SEE **BOYDEN**, PAGE 4



MIT's Dr. Ed Boyden kicks off the WALs season with a talk on Sept. 2 in Masur Auditorium.



**Adventure In Science.** Rebecca Burgess assists Tara Vidyababu (seated) in a DNA prep. AIS is currently recruiting teachers. See story, p. 12

## 'Total Worker Health' Programs Can Increase Employee Well-Being

BY ERIC BOCK

Safety and health programs that protect employees from work-related injury and illness along with wellness programs that promote environments supportive of healthy living can help employees reach their full potential. So said Dr. Anita Schill at the 2015 NIH Safety, Health and Wellness Day in Kirschstein Auditorium, Bldg. 45.

Known as Total Worker Health Programs (TWHP), these types of programs "integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts—all in the name of advancing worker well-being," said Schill, a senior science advisor to the director of CDC's National Institute for Occupational Safety and Health.

TWHPs follow several guiding principles,

SEE **SAFETY**, PAGE 6



NINR's Kevin Green is an ultramarathoner.

## NINR's Green Prepares for First 100-Mile Race

BY ERIC BOCK

A few weeks ago, NINR senior budget analyst Kevin Green and three friends were running along a mountain ridge west of Harrisonburg, Va. They came upon a clearing and heard a rustling in the bushes; a black bear cub scurried away.

Green wouldn't have seen the cub had he not been training for the Grindstone 100, a

SEE **GREEN**, PAGE 8

### ALSO THIS ISSUE

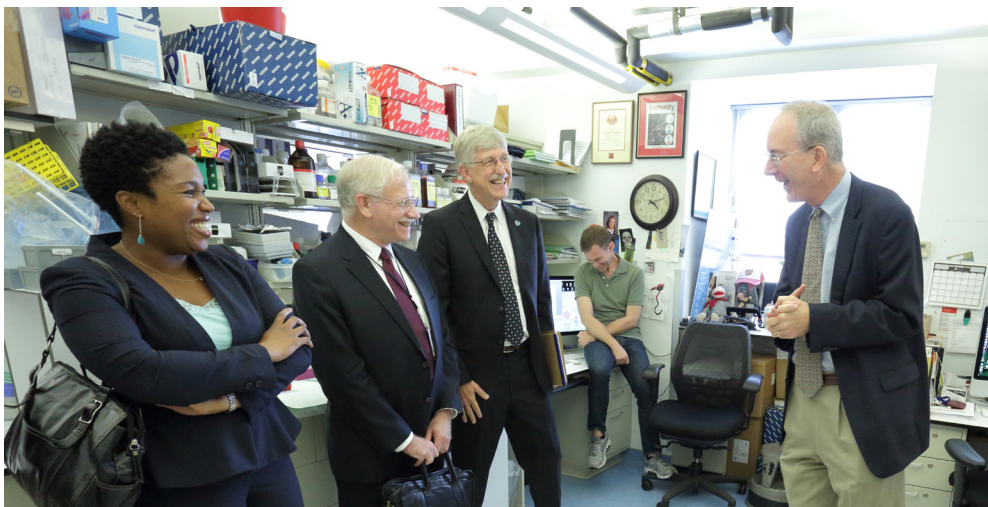
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### OMB's Akamigbo Visits NIH

NIH welcomed Dr. Adaeze Akamigbo (above, c), the new associate director for health programs at the Office of Management and Budget, on Aug. 28. NIH director Dr. Francis Collins greeted her and her assistant Sarah Haile. The group met with other NIH officials in the Clinical Center's medical board room before touring the laboratory of Dr. Louis Staudt (at right), director of NCI's Center for Cancer Genomics, who briefed the group on precision medicine in lymphoid malignancies.



Touring the lab of NCI's Dr. Louis Staudt (r) are (from l) Dr. Adaeze Akamigbo, associate director for health programs at the Office of Management and Budget, HHS senior program analyst Mitchell Goldstein, Collins and senior staff scientist Dr. Art Shaff of NCI's Lymphoid Malignancies Branch.

PHOTOS: ERNIE BRANSON



### Cornhole Becomes 'Olympic' Sport

On Aug. 27, the NIH Division of International Services (DIS) played cornhole (above) on the lawn near the Bldg. 31B entrance during their lunch break. Immigration specialist Katie McLaughlin, one of the organizers, said the game was part of a bi-weekly effort called the "DIS Olympics" to encourage teamwork and physical activity. Another organizer, operations coordinator Valerie Martini, said past "Olympic" events have included a basketball free-throw shooting contest and a bocce ball game.

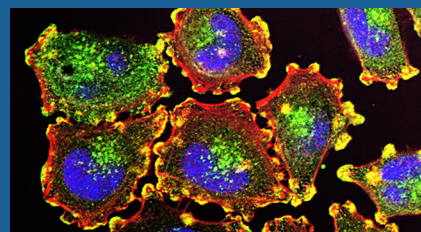
A week later, on Sept. 3, the sport was Frisbee horseshoes, which took advantage of two things: the green, flat grass outside DIS doors, and generous shade provided by Bldg. 31 on a 90-degree day.

PHOTO: ERIC BOCK

### Global Health Interest Group Holds Annual Symposium

The NIH global health interest group's annual symposium is set for Thursday, Oct. 15 from 12:30 to 5 p.m. in Natcher Conference Center, Balcony B. The theme is the "Impact of Climate Change on Global Health."

Weather and climate play significant roles in people's health. Warmer average temperatures or increases in the frequency/severity of extreme weather events induced by climate change could increase the number of weather-related illnesses and deaths and affect border security over key resources. Join a discussion on how climate change affects all of us. Register at <http://bit.ly/1OsKmba>.



ON THE COVER: The ability of cancer cells to move and spread depends on actin-rich core structures such as the podosomes (yellow) shown here in melanoma cells. Cell nuclei (blue), actin (red) and an actin regulator (green) are also shown.

IMAGE: JULIO C. VALENCIA, NCI

### The NIH Record

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The *NIH Record* is recyclable as office white paper.

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Turning Discovery Into Health

## MRI Meets the ‘Maker’ Movement

BY TOM JOHNSON

Dr. Lawrence Wald considers himself a tool-maker. He is also an accomplished radiology professor at Harvard and an investigator at Massachusetts General Hospital.

In a recent presentation to the National Advisory Council for Biomedical Imaging and Bioengineering, Wald, a NIBIB grantee, explained how NIBIB fulfills an important role at NIH—supporting development of new tools and instrumentation, which is essential for scientific progress.

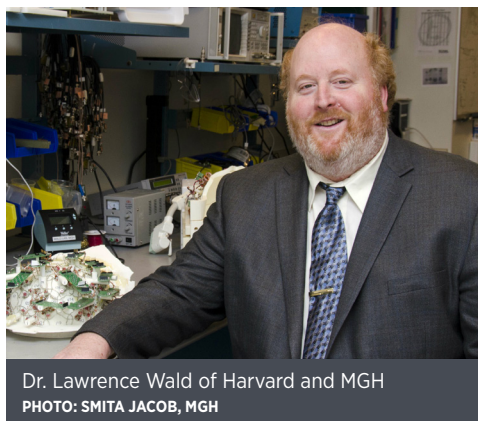
Examples he gave of the connection between development of new technologies and scientific breakthroughs included how Galileo’s telescope resulted in the end of the heliocentric theory of the universe and how the development of X-rays by William Roentgen resulted in widespread use of X-rays in the clinic in a mere 5 years. In each era, these toolmakers came to be known as the fathers of modern science in their respective disciplines.

Even though magnetic resonance imaging (MRI)—Wald’s field of study—has been used for more than 20 years now, he believes that we have just scratched the surface of harnessing MRI’s capabilities. Following the examples of Galileo and Roentgen, he is building new tools to dramatically expand the potential uses of MRI, a technology considered “miraculous” when first created.

He explained how several years ago, a 14-year-old girl with epilepsy was having 20 seizures per day. Using standard single-coil MRI, her brain appeared normal. However, a few years later when MRI systems incorporated additional coils, or detectors (4 coils instead of one) the images were higher resolution and revealed a malformation in the cortex, which was then removed surgically. The surgery rendered the patient seizure-free.

Epilepsy is just one example of how better images can transform diagnosis and treatment of neurological disorders that are described only by symptoms, because the physical causes are unknown. Improved imaging may reveal the underlying pathology and enable the appropriate therapy.

Many MRI advances have come from software that is developed to enhance images after the hardware captures the



Dr. Lawrence Wald of Harvard and MGH  
PHOTO: SMITA JACOB, MGH

image. Devices with only one or a few detectors capture a fixed amount of information to create images. Increasing the number of detector coils several fold, so they form an array of coils that surround the subject, creates a higher resolution image by capturing more information during the procedure. The Wald lab is building such array-based devices that improve image clarity and speed up procedure times.

To obtain higher resolution MRI images, the group built a unit that surrounds the head with an array of 64 detector coils. An additional component, containing 19 detector coils, was built to image the area around the cervical spine (C-spine), which is difficult to do with conventional MRI detectors. Each coil provides an additional channel through which image information is transmitted during the MRI.

The C-spine device was sensitive enough to obtain high resolution images of the cervical vertebrae in healthy control individuals as well as in those with amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig’s disease. The 19-coil C-spine array, for the first time, revealed an image of the inflammation present in the spine of an ALS patient. The image exposed an underlying physical pathology associated with the disease, which had previously only been described by symptoms observed in individuals with ALS.

The MRI technology currently in use requires large, expensive magnets and tons of metal shielding; it also consumes a lot of energy and needs sophisticated cryogenics to cool the mammoth system. Such systems currently exist only in the radiology departments of large hospitals. Thus, another goal is to develop tools to create much smaller MRI devices that can be transported easily and used in a wide range of settings, including

remote regions. These smaller, portable MRIs that Wald’s lab is building do not create the high-resolution images obtained with large, immobile MRI devices. However, the smaller devices with lower resolution still provide enough clarity to detect critical conditions that require rapid interventions.

These include conditions that involve the rapid accumulation of fluid in the brain such as edema in severe preeclampsia in pregnant women, which increases a woman’s risk of stroke and development of cardiovascular disease. Identification of the condition with MRI allows for monitoring and treatment to reduce the risk of future cardiovascular events. Another example is hydrocephalus, which can be congenital or resulting from head injury or infection. Approximately six of 10 people with hydrocephalus die without treatment. Identification of the condition with MRI allows for the immediate insertion of a shunt to drain the deadly buildup of cerebral spinal fluid.

“Our goal is to develop an MRI system with a magnet I can hold in one hand and the rest of the device I can hold in the other,” says Wald. “The device would have reduced sensitivity but would be good enough to give a ‘yes’ or ‘no’ answer at the point of care about whether a patient has a life-threatening injury or condition that requires immediate attention.”

The group has developed a prototype, which features the small, lightweight magnet Wald envisioned.

The lab plans to test the portable prototype in Uganda. Wald explains the significance of bringing their technology to the site in Africa: “Hydrocephalus is a life-threatening condition, common in developing countries where it is caused by infectious diseases. It is a situation where the swelling of the brain means certain death, but if diagnosed in time can be relieved by the relatively simple insertion of a shunt.”

Wald’s work to improve MRI receives high praise from NIBIB director Dr. Roderic Pettigrew. “Twenty-five years after the discovery of MRI, which, at the time was considered a phenomenal ground-breaking technology, Dr. Wald’s team is inventing new tools to revolutionize the use of MRI. It is an outstanding example of the technology development that NIBIB supports—innovative creation of game-changing breakthroughs with the potential to significantly improve and widen access to health care in the U.S. and worldwide.” **R**



...  
*“Our hope is that one day we can visualize the structure of the genome.”*  
 ...

—DR. ED BOYDEN

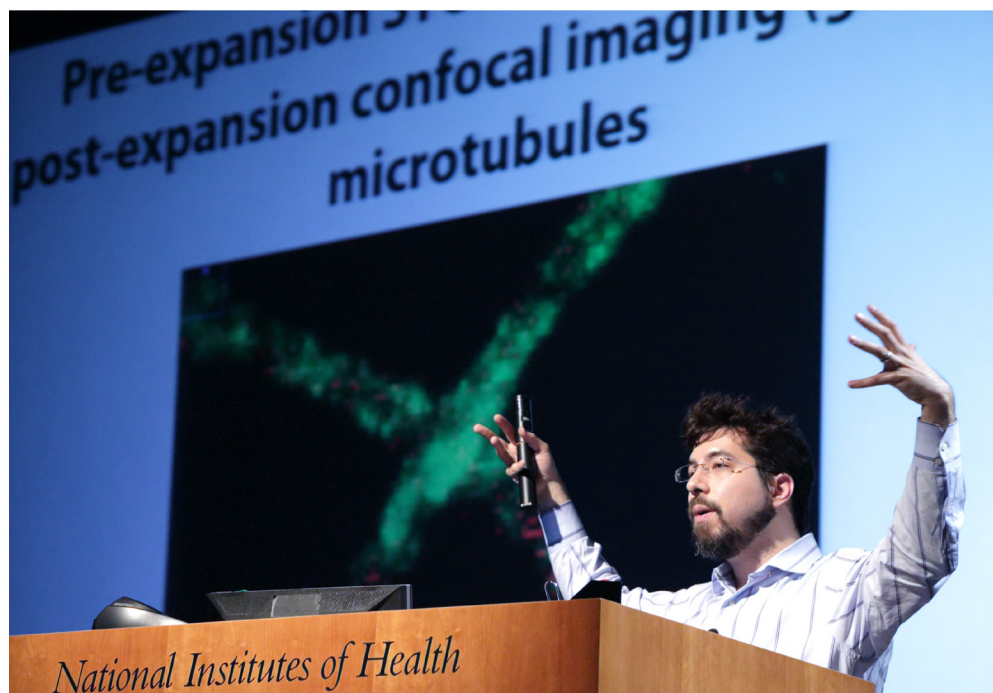
## Boyden

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physically inflate cells and tissues using the same chemistry that permits a baby diaper to absorb urine. Sodium polyacrylate swells with the addition of water, up to nearly 5 times its original size. Boyden’s team has invented “expansion microscopy,” which enables a regular microscope to attain super-resolution images.

Boyden said that work in the 1970s on responsive polymers led to this new approach, wherein specimens are fixed and labeled, forming a swell-able gel that can expand the sample, which is structurally disrupted with enzymes. The addition of water serves as an amplifier.

“Our hope is that one day we can visualize the structure of the genome,” he said. Displaying colorful slides of magnified cells and tissues, he quipped, “I can stare at these all day.”



His wit was also evident when he observed that this process “doesn’t work, of course, in live samples. Expanding something 20 times isn’t compatible with living.”

Not that living specimens are off limits. Boyden and his colleagues are building robots that can perform automated patch-clamping, directed by computer, in the brains of live animals.

The talk, titled “Tools for analyzing and repairing complex biological systems,” covered mapping biological pathways,

recording them and lastly controlling them; neurons can be made sensitive to light, using microbial opsins. This enables “single-cell resolution optogenetics.”

Boyden admits, “Controlling the brain is very hard to do.” But you have to start somewhere.

The hour-long talk, accessible only to HHS employees (much of the work is yet unpublished), is online at <http://videocast.nih.gov/summary.asp?Live=16892&bhcp=1>.

**Rich McManus**



Boyden (l) leads the MIT Media Lab’s synthetic neurobiology research group, which develops tools for mapping, controlling, observing and building dynamic circuits of the brain. It uses these neurotechnologies to understand how cognition and emotion arise from brain network operation, as well as to enable systematic repair of intractable brain disorders such as epilepsy, Parkinson’s disease and post-traumatic stress disorder.

PHOTOS: BILL BRANSON

## NLM Announces First Lindberg & King Lecture

Oct. 7

The National Library of Medicine will host the first annual Donald A.B. Lindberg & Donald West King Lecture on Wednesday, Oct. 7 at 1 p.m. in Masur Auditorium, Bldg. 10. The inaugural lecture, which honors recently retired NLM director Lindberg and former NLM deputy director of research and education King, is titled, “Integrating Multi-scale Data for Biomedical Discovery and Clinical Implementation.” It will be given by Dr. Russell Altman of Stanford University. Altman’s primary interests are in the field of bioinformatics. He is particularly interested in the analysis of protein and RNA structure and function, both in an



individual problem-centered manner and on a functional genomic scale. He currently serves as a member of the advisory committee to the NIH director.



## Bldg. 7 Cornerstone Preserved

The demolition of Bldg. 7 has begun with the removal of its cornerstone Sept. 4. Workers from subcontractor Vulcan Group carefully chipped away at the outside of the cornerstone, a slab of granite weighing between 600-800 pounds, and gently lowered it to a cushioned pallet without damaging the stone—or anyone's fingers, for that matter.

Moving the pallet from the wall to the sidewalk proved to be no simple task. A foot-high “silt fence” lining the construction site, set up to prevent run-off from the site onto the street, blocked a forklift from entering. After brainstorming different solutions—spurred by a serendipitous meeting with ORF Director Dan Wheeland, who was walking by at the time—an excavator pulled the pallet out and then lifted it like a precious gift over the fence to the waiting forklift operator. It was then off to storage at the NIH Stetten Museum collection. Michele Lyons, curator of the Stetten Museum, was on hand to watch the removal in case there was a time capsule deposited behind the stone. Unfortunately, there was not.

Bldg. 7 opened in 1946 and was called the Memorial Laboratory in honor of employees who had died while researching infectious diseases. There are articles in past issues of the *NIH Record* and the *Catalyst* describing the history of Bldg. 7. It will take several months to demolish the building.



Above, the first stages have begun to demolish Bldg. 7, located on Memorial Drive just south of the Clinical Center loading dock.

At right, on Aug. 27, workers remove the chimney brickwork by hand. Once they get that down to roof level, they will then bring in a pulverizing machine to take down the whole building.

The entire process, including restoration of the site to a grassy area, is scheduled to last through March 2016. Security fencing surrounds the building and the walkway. The pedestrian stairwell just north of the structure will remain closed during this project.

At certain stages of the demolition, temporary road closures on Memorial Drive will be required to accommodate underground utility work. If you have any questions or concerns, contact ORF project officer Earl Johnson at johnsoe@ors.od.nih.gov or (301) 594-7964.

PHOTOS: CARLA GARNETT, BILL BRANSON



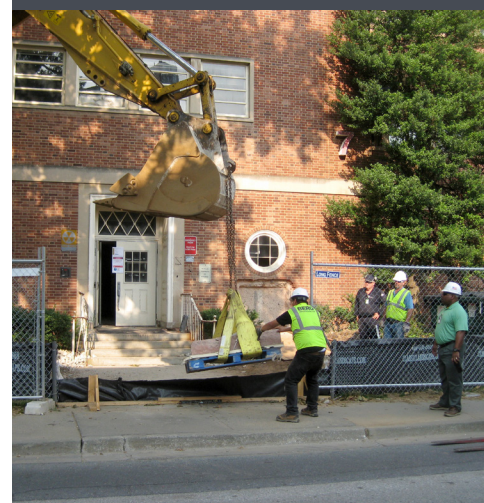
## 'MEMORIAL LAB' MEMENTO



Above, Vulcan Group's Carlos Ramos (l) and Wes Parrish lower the cornerstone. Rene Cathelineaud is inside with the guide rope.

Below (from l) Cathelineaud, Carl McCann of ORF, Parrish and ORF's Earl Johnson watch as Ramos uses the excavator to lift the cornerstone over the silt fence.

PHOTOS: MICHELE LYONS





## Safety

CONTINUED FROM PAGE 1

she noted. Participation must be voluntary, with privacy protections for sensitive individual information. Employees must have input into the program's design. Incentives must be offered wisely. Finally, the program should always focus on long-term goals. Creating a culture that protects employees and promotes health takes time, she added.

Schill cited the prevention of musculoskeletal disorders, such as arthritis, to illustrate what the program looks like in the workplace. TWHPs provide ergonomic evaluations of office space while offering employees strategies, such as exercises and stretches, to manage arthritis.

This approach differs from traditional occupational safety and health protection programs and wellness programs that employers implement to fulfill legal requirements and to comply with relevant labor laws. Traditional programs are often managed by departments or offices that don't interact with each other, despite having similar missions. One office, for instance, may focus on preventing workplace injuries independently of another office that focuses on promoting healthy lifestyles. The TWHP approach bridges the gap.

Implementing TWHPs also can reduce health care costs associated with workplace



Dr. Antony Schwartz of ORS's Division of Occupational Health and Safety was turned upside down on an inversion table, a device that decompresses a person's spine, at the 2015 NIH Safety, Health and Wellness Day. The event included a keynote talk and multiple exhibits touching on all aspects of workplace well-being.

PHOTOS: ERNIE BRANSON

injuries. Schill estimates that 4 million workers experience nonfatal work-related injuries and illnesses each year. The cost of these injuries is estimated at \$250 billion per year with indirect costs, such as productivity, responsible for most of the expense. Most costs are covered by Medicare, Medicaid and health insurance.

a Total Worker Health approach will benefit the end outcome of improved well-being," she said.

Schill noted that employers can redesign jobs, give workers more freedom to make decisions, build social support systems and make jobs safer while "at the same time creating environments that enhance oppor-



NIOSH's Dr. Anita Schill stressed the importance of health and wellness programs that protect employees from work-related injury and promote healthy lifestyles.

★ ★ ★

*"When work is meaningful, energizing and exciting, your life is meaningful, energizing and exciting."*

-DR. ANITA SCHILL

★ ★ ★

"These work-related injuries and illnesses contribute to rising health care costs and rising health care costs mean rising health insurance premiums for all of us," she added.

As obesity rates rise and the workforce ages, TWHPs are becoming more important, she said. A recent NIOSH-funded study found that increased stress levels at work led to higher levels of obesity. Stressors include limited decision-making ability, poor coworker support, heavy lifting, night work and physical assault.

"Obesity becomes a prime example where

tunities for physical activity and providing healthy food options."

Today, there are more workers age 55 and older than ever before. She said employers must build flexible work arrangements to allow employees to take time off for doctor's appointments, give workers tasks that match their capabilities and equip employees with the skills needed to thrive in a multigenerational workplace.

She cautioned that implementing TWHPs "takes dedication." Despite the challenges, there are benefits for employers and





Above, staff from CYCLED! conduct spinning classes in Kirschstein Auditorium's Balcony A, Bldg. 45. Below, NCI's Dr. Amanda Vandever (second from l) and Diane Poole show their first-place submission to the 2014 ORS Division of Occupational Safety and Health "In Focus! Safe Workplaces for All" photo contest. Nancy McLean-Cooper and Lydia Kibiuk (r) look on.



employees. For example, she said, employers will be able to attract and retain the best workers, while employees will be healthier and have greater job satisfaction.

"When work is meaningful, energizing and exciting, your life is meaningful, energizing and exciting," she said. "Great work fulfills our potential."

For more information on TWHP, see [www.cdc.gov/niosh/twh/totalhealth.html](http://www.cdc.gov/niosh/twh/totalhealth.html). **R**

## NIH Community College Day Set

The NIH Office of Intramural Training & Education will hold Community College Day 2015 on Tuesday, Oct. 20 from 8 a.m. to 4 p.m. at the Natcher Conference Center. This event will provide community college students and faculty an opportunity to visit the NIH campus and learn about careers and training in biomedical and health care fields. To register and for more information visit [www.training.nih.gov](http://www.training.nih.gov).

## NIGMS To Host Cell Day Web Chat

On Thursday, Nov. 5 from 10 a.m. to 3 p.m., NIGMS will host Cell Day 2015, a web chat targeted to middle and high school students but open to all. Students from around the country will be able to ask NIGMS scientists questions about cell biology, biochemistry, research careers and other related topics. To join the live chat or get additional information about Cell Day, see <http://nigms.nih.gov/cellday>.

## NINR, NCATS Host Two Workshops

The National Institute of Nursing Research recently hosted two workshops with the National Center for Advancing Translational Sciences.

The first workshop, "The Spectrum of Caregiving and Palliative Care in Serious, Advanced Rare Diseases," brought together a community of experts in palliative care, pediatrics and adolescent care, oncology and neurology to examine key priorities and research questions about knowledge gaps in palliative care and caregiving for those affected by rare diseases. The workshop highlighted the need for research focused on caregivers and families of those facing advanced rare diseases, since most rare disorders have intensive, long-term caregiving and palliative care needs.

Participating was Grace Whiting, director of strategic partnerships for the National Alliance for Caregiving, who touched on the role of research in improving quality of life for patients and families by providing an "evidence base" to improve clinical, patient and caregiver understanding of the benefits of palliative care.

NINR director Dr. Patricia Grady ended the day with remarks emphasizing the need to consider the wishes of the patient and family: "What people want is quality of life. We have to think about whether an intervention really helps achieve patient and family goals."

The second workshop, "Advancing Symptom Science through Symptom Cluster Research," was held to stimulate evidence-based discussion on the state of the science of symptom clusters in chronic conditions, such as rare cancers. The workshop emphasized that a transformation is needed to enhance quality of life for those living with chronic illnesses.

The workshop involved an interdisciplinary working group of experts from the extramural clinical research community and partners from other NIH institutes. There was representation from nursing, medicine, oncology, psychology and bioinformatics. The day was divided into four sessions of panel presentations addressing key science areas such as defining characteristics of symptom clusters, underlying causative mechanisms, identification of priority clusters, measurement issues, targeted interventions and new analytic strategies.

Expert discussion after each presentation allowed gaps and opportunities within the science areas to emerge. The chair of the working group, Dr. Christine Miaskowski, American Cancer Society clinical research professor and endowed chair in symptom management research at the University of California, San Francisco, ended the day with a session to gather consensus on definitive elements to be included in a future blueprint to guide symptom clusters research in chronic conditions.



Above, Dr. Andrea Barsevick, director of nursing research at Fox Chase Cancer Center, speaks at the workshop on symptom science. Below, NINR director Dr. Patricia Grady (front, fourth from r) and palliative care experts meet at a recent joint NINR-NCATS workshop.





## Green

CONTINUED FROM PAGE 1

grueling 101.85-mile race that winds through Virginia's scenic Blue Ridge Mountains. Next month, he'll race up and down some of the highest mountains in Virginia. Organizers bill it as "the hardest 100-miler east of the 100th meridian."

The race begins at 6 p.m. on Friday, Oct. 2. Green expects to start then, run through Saturday and finish sometime on Sunday. If he finishes, he'll have climbed and descended roughly 23,000 feet in under 38 hours. All the while, he'll carry food, three water bottles, a windbreaker and a headlamp.

"I want to be on a mountain top at dawn and see the sun rise over the Blue Ridge," Green said.

When he's not training, Green works in NINR's Office of Financial Services. His responsibilities include oversight of the formulation and execution of his institute's budget. Before he started at NINR, he was part of a team that helped deploy the NIH Business System, which helps staff manage business operations. He also worked at NCCIH.

Green came to NIH in 2000 as part of the

Presidential Management Fellows Program. For 5 years, he led a sedentary life. He'd go home and turn on the television. After a while, he "got tired of watching the evening news." So he started running. At first, he stopped after a mile. Sometimes he ran, sometimes he walked. But he kept with it. Soon after, he was running 5K races, 10Ks, triathlons and then marathons.

He joined the Montgomery County Road Runners, an area running club. There, Green built friendships with local runners, many of

said. "After a few years of keeping high miles, I needed a change."

His friends suggested he run ultramarathons—technically, any race longer than 26.2 miles. Most ultramarathons, however, are 50K or longer. He started training for a 50K trail run because "training for a marathon and a trail run are similar." He's been running 50Ks and 50-mile races since.

The Grindstone is his first 100-mile race. To prepare, Green has trained 5 days a week for the last 6 months. During the

• • •  
*"The most important thing is putting time on your feet. I don't care about my pace. I tell people, 'I'm going on a 7-hour run and following it up with a 3- to 5-hour run the next day.'"*

—KEVIN GREEN

• • •

whom offered advice on how to improve his race times and reduce his risk of injury while training.

"I was running 3 marathons a year as well as triathlons and Ironman competitions," he

week, he runs 7 to 10 miles a day after work. On Saturdays, he covers 25 to 30 miles. On Sundays, he cuts back to 16 to 20 miles. He rests on Monday and Friday.

He trains in the mountains during the weekend. He's run in Shenandoah National Park and Catocin Mountain Park near Frederick, Md., and along parts of the Appalachian Trail and the Grindstone course. At the moment, he's cutting back the mileage so he'll be healthy on race day.

"The most important thing is putting time on your feet," said Green. "I don't care about my pace. I tell people, 'I'm going on a 7-hour run and following it up with a 3- to 5-hour run the next day.' I'm conditioning my muscles and skeletal structure for the race."

Part of his training includes figuring out what he can eat. He's learned that homemade energy bars made of chicken sausage, eggs, sushi, rice and soy sauce give him more energy than store-bought energy bars. During the first part of the race, he'll eat as much solid food as possible.

"At some point, my body won't be able to take in solid foods. My stomach will shut down and my throat will swell," he said. When this happens, Green will consume a sports drink consisting of potassium, magnesium, carbohydrates and electrolytes.

The Grindstone's evening start time is unusual for ultramarathons. Typically, races begin early in the morning to give racers a full



Recently, Green ran the Grand Canyon Rim-to-Rim-to-Rim trail. It begins at the canyon's South Rim, winds down to the Colorado River, climbs up to the North Rim and then back to the South Rim. It takes 10-14 hours to run.





For the last 6 months, Green has been training for the Grindstone 100, a grueling 101.85-mile race in Virginia's mountains.

day of light. Green believes the late start time will force him to take the beginning of the race more slowly than usual. In some places, he'll walk briskly because the terrain is so rocky.

"There's no way I'm starting too fast," he laughed. "This isn't a marathon where you're thinking about your time."

Along the course, he'll pass aid stations staffed by volunteers who provide runners with food, water and energy drinks. He can also place "drop bags" of personal items—like clean clothes or his special energy bars—at these stations ahead of time, so they'll be there when he needs them.

He anticipates there will be low moments because "there are always low moments" during long races. His feet will hurt, his muscles will fatigue and cramp. He'll be running alone in the dark and want to quit. To get through, he'll have to figure out ways to motivate himself. Sometimes, the motivation might be as simple as saying, "I don't know if I can run another 20 miles, but I can get to the next aid station."

Green is running the race so he can grow as a runner and see what he can endure. The races are the only time he sees many of his friends. He hopes to see them at the finish line, where there will be a picnic.

"I won't forget those moments," Green said. **R**

## More Than Half of Asian Americans with Diabetes Are Undiagnosed

More than half of Asian Americans and nearly half of Hispanic Americans with diabetes are undiagnosed, according to researchers from NIH and the Centers for Disease Control and Prevention. Their results were published Sept. 8 in the *Journal of the American Medical Association*.

Additionally, prevalence of diabetes for all American adults went up, from nearly 10 percent to over 12 percent between 1988 and 2012. Diabetes prevalence—how common the condition is—also went up in every age, sex, level of education, income and racial/ethnic subgroup. One bright spot: The proportion of people with diabetes that was undiagnosed decreased 23 percent between 1988-1994 and 2011-2012. The statistics account for age differences across the surveys.

Using newly available 2011-2012 data from the CDC's National Health and Nutrition Examination Survey, researchers were able to quantify diabetes prevalence for Asian Americans for the first time and found that they have the highest proportion of diabetes that was undiagnosed among all ethnic and racial subgroups studied, at 51 percent. Diabetes was also common in Asian Americans, at 21 percent. Hispanic Americans had the highest prevalence of diabetes at nearly 23 percent, with 49 percent of that undiagnosed.

"The large proportion of people with undiagnosed diabetes points to both a greater need to test for type 2 diabetes and a need for more education on when to test for type 2 diabetes, especially since populations such as Asian Americans may develop type 2 at a lower body mass than other groups," said the study's senior author Dr. Catherine Cowie, director of diabetes epidemiology programs at NIDDK.

## Calorie Restriction Lowers Some Risk Factors for Age-Related Diseases

An NIH-supported study provides some of the first clues about the impact of sustained calorie restriction in adults. Results from a 2-year clinical trial show calorie restriction in normal-weight and moderately overweight people failed to have some metabolic effects found in laboratory animal studies. However, researchers found calorie restriction modified risk factors for age-related diseases and influenced indicators associated with longer life-span, such as blood pressure, cholesterol and insulin resistance. The study was reported in the September issue of the *Journal of Gerontology: Medical Sciences*.

Calorie restriction is a reduction in calorie intake without deprivation of essential nutrients. It has been shown to increase longevity and delay the progression of a number of age-related diseases in multiple animal studies.

"The study found that this calorie restriction intervention did not produce significant effects on the pre-specified primary metabolic endpoints, but it did modify several risk factors for age-related diseases," said NIA director Dr. Richard Hodes.

In laboratory animals, calorie restriction's favorable effects on life-span have generally been found when it is begun in youth or early middle age. An equivalent trial in people would take decades. However, shorter trials can determine feasibility, safety and effects on quality of life, disease risk factors, predictors of life-span and effects on mechanisms influenced by calorie restriction in laboratory animal studies.

The study also assessed calorie restriction's effects on mood (particularly hunger-related symptoms) and found no adverse effects. No increased risk of serious adverse clinical events was reported.

## Rates of Survival Increasing for Extremely Preterm Infants

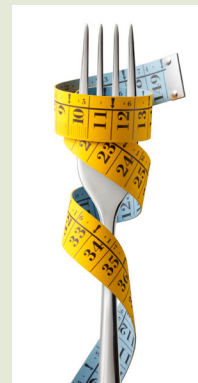
Extremely preterm infants, those born before the 28th week of pregnancy, are surviving in greater numbers and escaping serious illness, according to a comprehensive review of births in an NIH research network.

The study, published in the *Journal of the American Medical Association*, reviewed the birth records of more than 35,000 premature infants born from 1993 to 2012 in 26 U.S. centers participating in the Neonatal Research Network, a program funded by NICHD.

Among the major findings:

- Infants born at 23 and 24 weeks survived in greater numbers over the 20-year period. Of those born at 24 weeks, for example, only 52 percent survived in 1993 while 65 percent survived in 2012.
- A higher number of premature infants survived without major illnesses. For infants born at 27 weeks, for example, survival without major illness increased from 29 percent in 1993 to 47 percent in 2012.

"NICHD has funded newborn care research for many years," said Dr. Rosemary Higgins, who oversees the Neonatal Research Network. "We're now seeing the results of that investment in improvements in survival and outcomes." More than 450,000 premature babies are born each year in the United States. Higgins attributed the boost in survival to advances in maternal and newborn care, such as the increased use of antenatal steroids, drugs given to women at risk for preterm birth to help stimulate lung development in the fetus.





Dr. John Bowers

## Bowers Directs CSR Division

Dr. John Bowers has been named director of the Division of Translational and Clinical Sciences at the Center for Scientific Review. He has been acting director of DTCS and chief of CSR's biological chemistry and macromolecular biophysics integrated review group.

"Dr. Bowers brings a dynamic combination of leadership skills and scientific expertise to this job," said CSR director Dr. Richard Nakamura. "His experience applying emerging bio-imaging understandings in research to improve clinical care gives him a strong scientific base for leading this important division."

The Division of Translational and Clinical Sciences coordinates reviews of NIH grant applications in an array of clinical and basic research areas, with the common goal of applying scientific discoveries to the treatment of clinical disorders. The areas covered include cardiovascular and respiratory science, blood disorders, oncology and surgery and bioengineering. The division has 5 integrated review groups with 34 study sections.

Bowers earned his Ph.D. in chemistry from the University of Illinois, where he did NMR studies of membrane proteins. He then went to the department of radiological services at Deaconess Hospital in Boston and worked on the development of fast chemical-shift imaging techniques and non-invasive magnetic resonance-based assays for liver graft viability. He directed the department's division of hepatology research and then its division of basic research. He also was an assistant professor of radiology at Harvard Medical School before joining CSR in 1997 to be scientific review officer of its metallobiochemistry study section.

## NCI's Wolpert DeFilippes Retires After 44 Years

Dr. Mary K. Wolpert DeFilippes retired on June 3 after 44 years at NCI. She witnessed dramatic changes in anticancer drug discovery and development, from cytotoxic drugs to an era of molecular medicine focused on targets and pathways and, finally, "precision medicine."

A native of Iowa, she received a Ph.D. in pharmacology at the University of Michigan. Following postdoctoral training at Yale University, she joined NCI in 1971 as a staff fellow in the Laboratory of Chemical Pharmacology, where she worked on mechanistic studies of maytansine, a potent tubulin binder, and evaluated blood levels of AIDS drugs in Clinical Center patients.

She then transitioned to extramural positions in the Division of Cancer Treatment & Diagnosis where she served the extramural research community until her retirement. Her service was recognized by several NIH Merit Awards and election as fellow of the American Association for the Advancement of Science in 2012.

A favorite early assignment in the extramural program, where she rose to deputy chief of the Drug Evaluation Branch, was chairman of the platinum analog working group. She coordinated evaluations of hundreds of cisplatin analogs and identified carboplatin as a less toxic drug candidate. These studies led to clinical trials for carboplatin and FDA approval.

From 1986 to 2015, she worked in the Grants and Contracts Operations Branch, rising to branch chief in 1997. The branch manages NCI's second largest grant portfolio, covering all aspects of preclinical drug discovery and development. She also provided insight and served on several committees, including NIH's program leadership committee, to develop and implement new policies and procedures.



Dr. Mary K. Wolpert DeFilippes

A career highlight was her involvement and later overall coordination of National Cooperative Drug Discovery Groups, public-private partnerships that ended in 2010. These cooperative agreements led to clinical trials of more than 20 agents and marketing of 6.

Wolpert was considered a "grant policy guru" and "go to" person. She always encouraged co-workers and trained several new employees with exceptional patience. In her new life away from NCI, she intends to stay busy with reading, family visits, volunteering, traveling and genealogy studies.



Dr. Eileen G. Hasselmeyer

## Former Assistant Surgeon General Hasselmeyer Mourned

Dr. Eileen G. Hasselmeyer, 91, who retired in 1989 after more than 29 years of active duty with the Commissioned Corps—26 of which were spent with the National Institute of Child Health and Human Development—died of cancer June 6.

Before retiring, she was associate director for scientific review, NICHD, and special assistant to the director, National Center for Nursing Research. In 1981, she achieved the rank of rear admiral and assistant surgeon general.

Hasselmeyer, a 1946 graduate of Bellevue School of Nursing, received a baccalaureate degree in education, a master of science degree in administration and a Ph.D. in nursing science from New York University. Following a 10-year association with the NYU pediatric metabolic and nutritional research service, she joined the PHS Division of Nursing Resources in 1956 and was principal investigator for the Behavior Patterns of Premature Infants Project—the division's first clinical research study of the relationship between nursing care and patient welfare.

When NICHD was established in 1963, she was appointed special assistant to the director and served



in various positions including director, Perinatal Biology and Infant Mortality Program, and chief, Pregnancy and Perinatology Branch.

On detail from NICHD in 1968-1969, she was appointed the Annie W. Goodrich professor of nursing at Yale University.

Hasselmeyer was responsible for developing the sudden infant death syndrome (SIDS) research initiative in the Department of Health, Education and Welfare, for which she received the PHS Commendation Medal. Between 1977 and 1984, she was project officer for the NICHD cooperative epidemiologic study of SIDS risk factors.

Hasselmeyer was awarded a National League for Nursing Commonwealth fellowship and an NIH special research fellowship and was also the recipient of research grants from the American Nurses Foundation, Sigma Theta Tau and the Connecticut state health department. She also received the NYU Health Professions Creative Leadership Award and a PHS Meritorious Service Medal in recognition of her many achievements, including her contributions to the establishment of the National Center for Nursing Research (now NINR) at NIH.

In recognition of Hasselmeyer's contributions to SIDS research, the Sudden Infant Death Syndrome Alliance established the Eileen G. Hasselmeyer Award to recognize individuals who have advanced the knowledge and understanding of SIDS.

Survivors include her niece, nephew and their spouses, a grandniece, three grandnephews and a great grandnephew and great grandniece. Interment with military honors was at St. John's Cemetery, Middle Village, N.Y.

## Li Mourned, Pioneer in Genetic Causes of Cancer

Dr. Frederick P. Li, a pioneer in establishing genetic risk factors for cancer and long-time collaborator with the National Cancer Institute's Division of Cancer Epidemiology and Genetics (DCEG), died June 10 at his home in Brookline, Mass. As a young clinician, Li joined NCI's Epidemiology Branch (now DCEG) as a commissioned officer in the Public Health Service.



Dr. Frederick P. Li

Li is perhaps best known for his contribution to the discovery of the cancer predisposition syndrome named for him and his collaborator, former DCEG director Dr. Joseph F. Fraumeni, Jr. The two identified what came to be known as Li-Fraumeni syndrome (LFS) from the study of a group of families with an unexpected constellation of tumors occurring at very young ages.

In 1990, using biological samples collected from those families, colleagues of Li and Fraumeni discovered that germline mutations in the TP53 tumor suppressor gene cause LFS. Li and Fraumeni's first description of LFS families had been published in 1969 in the *Annals of Internal Medicine*.

Reflecting on his first meeting with Li, Fraumeni recalled, "Fred was different from the many young physicians who were flocking to NIH at that time. His background in clinical medicine was matched by a passionate interest in public health. He seemed a natural for epidemiology and his intellectual curiosity and productivity were evident from the very start."

In recognition of their discovery of LFS and the identification of the gene responsible, Li and Fraumeni were awarded the Charles S. Mott General Motors Prize in 1995.

Among his many efforts at NCI, Li successfully mapped a gene in kidney cancer families, identifying a chromosomal translocation associated with elevated risk for the disease. He was instrumental in launching the study of cancer survivorship, leading efforts on risk for second malignancies after childhood cancer.

"Fred had a knack for making important clinical and epidemiological observations and taking them to the next level," said Fraumeni. "This often meant overcoming the considerable challenge of bringing together experts from multiple disciplines. [We] were drawn not only to the scientific ideas he generated, but also by his friendly, calm and thoughtful demeanor as well as his generosity of spirit."

In the late 1960s, Li helped found a free clinic in Boston's Chinatown, where he worked for years. "He was very concerned about social justice issues and felt it important to give back to those with fewer resources," said Dr. Margaret Tucker, another of Li's DCEG collaborators. "He was also involved in the early delegations to China, the opening up of U.S.-China relations and helped to develop their cancer research programs."

Later in his career at Dana-Farber Cancer Institute and Harvard, Li's focus extended to other hereditary cancer syndromes, the study of late effects of cancer and its treatment, preventive strategies in high-risk populations and, more recently, cancer control research in Asian-American and other minority populations. **R**

## Asthma Study Is Recruiting

Do you have asthma? NHLBI is seeking volunteers with asthma for a study. Two outpatient visits and one inpatient stay at the Clinical Center are required. Compensation may be provided. For more information, contact the Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010). Refer to study 99-H-0076.

## Adults with Bypass Surgery Sought

NIDDK seeks healthy adult volunteers who have had Roux-en-Y gastric bypass surgery. Doctors at NIH are conducting a clinical study of the effects of non-nutritive sweeteners among those who have had Roux-en-Y gastric bypass surgery. Compensation is provided. For more information, call 1-866-444-2214 (TTY 1-866-411-1010). Refer to study 10-DK-0163.

## Healthy Volunteers Wanted

A research study is now enrolling healthy people ages 18 to 65 who are free of psychiatric disorders and certain medical conditions. Researchers will evaluate the effects of the experimental medication ketamine on brain receptors in healthy and depressed adults. There is no cost to participate and compensation is provided. To find out if you qualify, email moodresearch@mail.nih.gov or call 1-877-646-3644 (TTY 1-866-411-1010). Ask about study 04-M-0222.

## NIAID Study Seeks Women

NIAID is seeking healthy women, 18-40, for a research study to learn more about why antibiotics increase a woman's risk of yeast infections. At least 7 outpatient visits take place at the Clinical Center. Compensation is provided. For more information contact the Office of Patient Recruitment, 1-866-444-2214 (TTY 1-866-411-1010). Refer to study 13-I-0181.

## Healthy Adults Sought by NIDDK

NIDDK seeks healthy adults without diabetes to participate in a research study. Doctors want to learn how a new FDA-approved diabetes medication affects bone health in healthy volunteers. Meals are provided and you will have outpatient visits and inpatient stays. Compensation is provided. For more information, call 1-866-444-2214 (TTY 1-866-411-1010). Refer to study 14-DK-0195.

## Study Seeks Healthy Older Adults

Healthy older adults ages 55-75 are invited to participate in an outpatient research study investigating the benefits of omega-3 oil and blackcurrant supplements on vascular health. The goal of the study is to determine whether the supplements improve blood flow and blood vessel function that can affect your heart. Eligible participants must be medication-free and in good general health. Compensation is provided. For more information, call 1-800-411-1222 (TTY 1-866-411-1010) and refer to study 14-NR-0034.



## 'Adventure in Science' Seeks Volunteer Teachers

PHOTOS: DA ZHANG, ED MAX

Adventure in Science (AIS), a non-profit science education program for children, is planning its 23rd year at NIH and is looking for volunteer teachers. The program, which meets on Saturday mornings October through March in Bldg. 10, is designed to show 8-11 year-olds the fun of science using hands-on activities—from building (and launching) model rockets to dissecting frogs, visualizing the activity of enzymes, measuring lung volumes and more. AIS teachers are mostly volunteers from the NIH community, from postdocs to institute and center

directors. This is a great opportunity to exercise your teaching skills with an enthusiastic audience. You can volunteer for only one Saturday or for several. If you are interested in AIS, read the "About Us" section at [www.adventureinscience.org](http://www.adventureinscience.org). Then, if you want to volunteer, think about possible topics you might teach and send your contact information to Vathani Arudchandran (Arulvathani.Arudchandran@fda.hhs.gov) and Ed Max (edward.max@fda.hhs.gov). Enrollment is currently full for children in the program beginning this October. Registration for the following year's program will open next spring and will be announced on the web site.

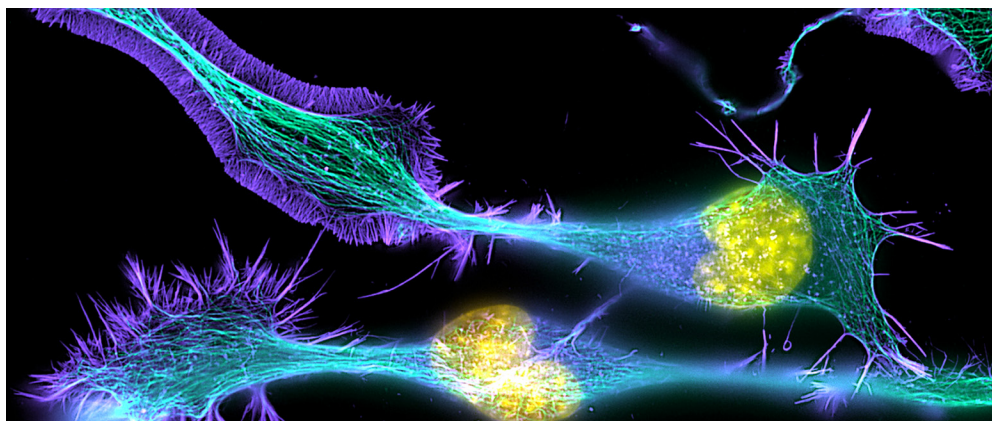
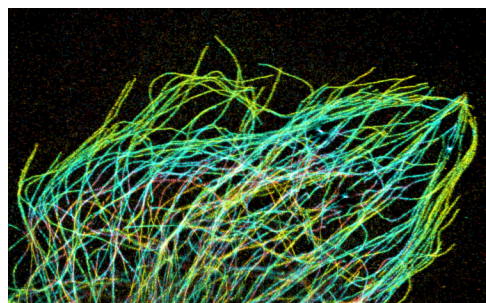
*At right, Marlena Wilson shows Aishani Bakshi what to look for as she dissects a squid.*



Above, left: Students gaze at a cow eyeball about to be dissected by Ed Max. Center: A volunteer from the National Museum of Health and Medicine enthralles a group of AIS students with a discussion of what can be learned from an examination of human bones. At right, Benedetta Naglieri instructs Eli Beuhler (l) and Ryan Rariewa on measuring the activity of amylase from their own saliva.



Above, bubonic plague bacteria on spines in the digestive system of a rat flea, captured by NIAID's B. Joseph Hinnebusch, Elizabeth Fischer and Austin Athman. At right, developing nerve cells captured by Torsten Wittmann, University of California, San Francisco. Below, strands of tubulin, a protein in the cell's skeleton, photographed in the NHLBI lab of Clare Waterman using a high-resolution microscopy technique honored with the 2014 Nobel Prize in chemistry



## 'Life: Magnified' Images on Display at NIH

Brain cells. Bone cancer. Ebola. Striking, close-up images of these and 10 other biomedical scenes now hang in the Clinical Center. You can see the photos, all produced by NIH intramural scientists or extramural grantees, in the corridor outside the NIH Library. The images are part of the *Life: Magnified* collection, which was recently on display at Washington Dulles International Airport and garnered extensive media coverage.

Magnified by as much as 50,000 times using powerful microscopes and imaging techniques, the photos showcase the rich diversity and activities of life at the cellular level. The images include healthy cells from the brain, eye and skin as well as the pathogens that cause bubonic plague and HIV. Some images feature model organisms commonly used in research such as zebrafish and fruit flies.

The complete *Life: Magnified* collection contains 46 images selected from more than 600 submitted by the scientific community. It was first displayed from June 2014 to January 2015 in Dulles airport's Gateway Gallery, where it was seen by an estimated 5.8 million travelers. You can see the entire collection and download high-resolution versions of its images at [www.nigms.nih.gov/education/life-magnified](http://www.nigms.nih.gov/education/life-magnified).